NEVADA COOPERATIVE SNOW SURVEYS

Seasonal Snow Survey and Kindred Data
with Forecast of Streamflow in Nevada
March 1, 1946

Part I. Eastern Sierra Nevada
By Nevada Forecast Committee:
H. P. Boardman, George Devore
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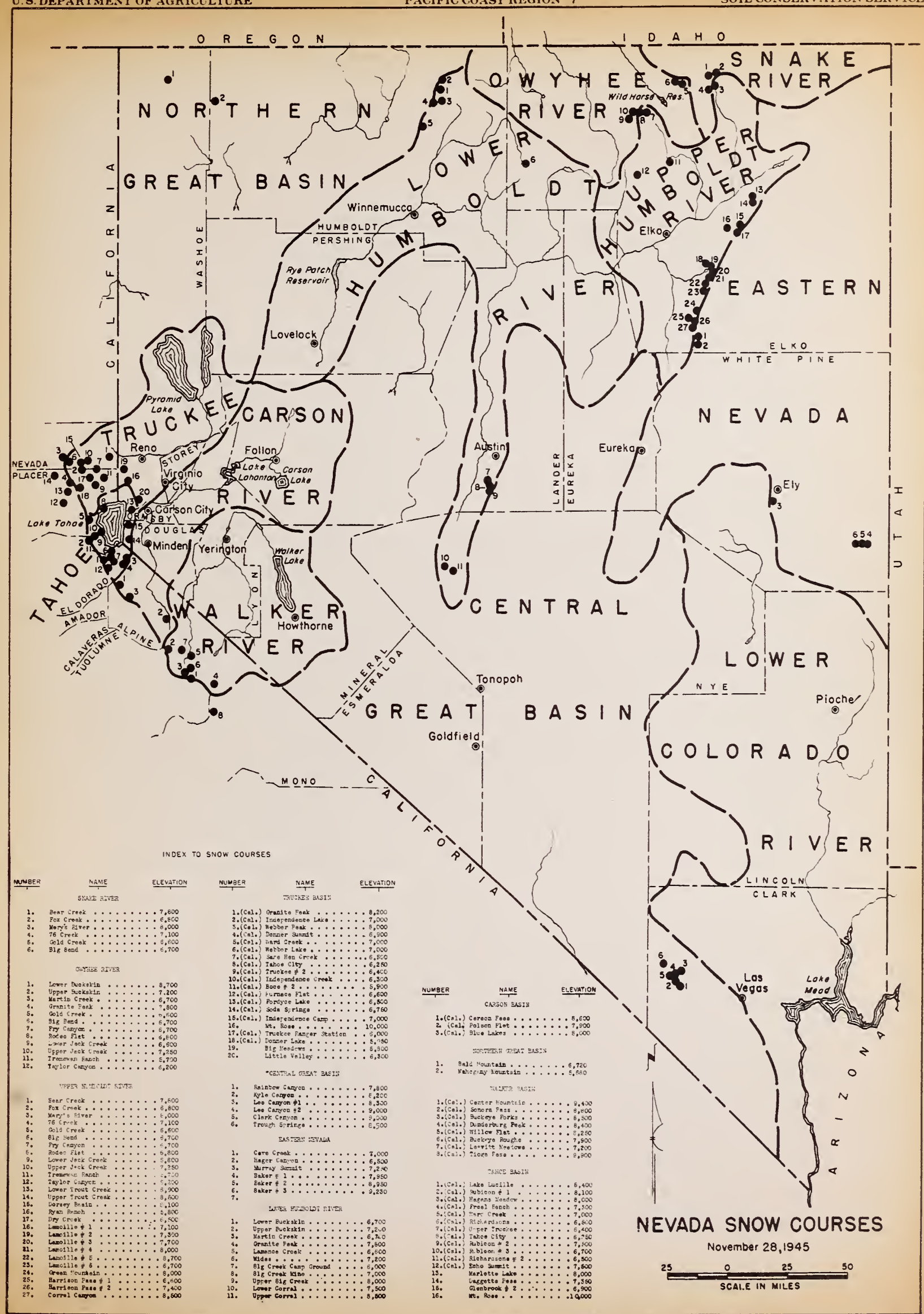
Part II. Humboldt River Basins
Eastern and Southern Nevada
and Nevada National Wildlife
Refuges
By J. E. Church, H. P. Boardman
and Clyde E. Houston

Nevada Agricultural Experiment Station
Reno, Nevada



INDEX TO SNOW COURSES

NUMBER	NAME	ELEVATION
	SNAKE RIVER	
1.	Bear Creek	7,600
2.	Fox Creek	6,800
3.	Mary's River	8,000
4.	76 Creek	7,100
5.	Gold Creek	6,600
6.	Big Bend	6,700
	OWYHEE RIVER	
1.	Lower Buckskin	8,700
2.	Upper Buckskin	7,200
3.	Martin Creek	6,700
4.	Granite Peak	7,800
5.	Gold Creek	6,600
6.	Big Bend	6,700
7.	Fry Canyon	6,700
8.	Rodeo Flat	6,800
9.	Lower Jack Creek	6,600
10.	Upper Jack Creek	7,250
11.	Tremewan Ranch	5,700
12.	Taylor Canyon	6,200
	UPPER HUMBOLDT RIVER	
1.	Bear Creek	7,600
2.	Fox Creek	6,800
3.	Mary's River	8,000
4.	76 Creek	7,100
5.	Gold Creek	6,600
6.	Big Bend	6,700
7.	Fry Canyon	6,700
8.	Rodeo Flat	6,800
9.	Lower Jack Creek	5,800
10.	Upper Jack Creek	7,250
11.	Tremewan Ranch	5,700
12.	Taylor Canyon	5,200
13.	Lower Trout Creek	8,900
14.	Upper Trout Creek	8,600
15.	Dorsey Basin	8,100
16.	Ryan Ranch	5,800
17.	Dry Creek	6,500
18.	Lamoille # 1	7,100
19.	Lamoille # 2	7,300
20.	Lamoille # 3	7,700
21.	Lamoille # 4	8,000
22.	Lamoille # 5	8,700
23.	Lamoille # 6	6,700
24.	Green Mountain	8,000
25.	Harrison Pass # 1	6,600
26.	Harrison Pass # 2	7,400
27.	Corral Canyon	8,600

NUMBER	NAME	ELEVATION
	TRUCKEE BASIN	
1.(Cal.)	Granite Peak	8,200
2.(Cal.)	Independence Lake	7,000
3.(Cal.)	Webber Peak	8,000
4.(Cal.)	Donner Summit	6,900
5.(Cal.)	Hard Creek	7,000
6.(Cal.)	Webber Lake	7,000
7.(Cal.)	Sare Hen Creek	6,800
8.(Cal.)	Tahoe City	6,250
9.(Cal.)	Truckee # 2	6,400
10.(Cal.)	Independence Creek	6,300
11.(Cal.)	Boca # 2	5,900
12.(Cal.)	Burnace Flat	6,600
13.(Cal.)	Fordyce Lake	6,800
14.(Cal.)	Soda Springs	6,760
15.(Cal.)	Independence Camp	7,000
16.	Mt. Rose	10,000
17.(Cal.)	Truckee Ranger Station	6,000
18.(Cal.)	Donner Lake	5,950
19.	Big Meadows	6,300
20.	Little Valley	6,300
	CENTRAL GREAT BASIN	
1.	Rainbow Canyon	7,800
2.	Kyle Canyon	8,200
3.	Lee Canyon #1	8,300
4.	Lee Canyon #2	9,000
5.	Clark Canyon	9,000
6.	Trough Springs	8,500
	EASTERN NEVADA	
1.	Cave Creek	7,000
2.	Hager Canyon	6,500
3.	Murray Summit	7,250
4.	Baker # 1	7,950
5.	Baker # 2	8,950
6.	Baker # 3	9,230
7.		
	LOWER HUMBOLDT RIVER	
1.	Lower Buckskin	6,700
2.	Upper Buckskin	7,200
3.	Martin Creek	6,700
4.	Granite Peak	7,800
5.	Lamance Creek	6,600
6.	Wides	7,200
7.	Big Creek Camp Ground	6,000
8.	Big Creek Mine	7,000
9.	Upper Big Creek	8,000
10.	Lower Corral	7,500
11.	Upper Corral	8,500

NUMBER	NAME	ELEVATION
	CARSON BASIN	
1.(Cal.)	Carson Pass	8,600
2. (Cal.	Folson Flat	7,900
3.(Cal.)	Blue Lakes	8,000
	NORTHERN GREAT BASIN	
1.	Bald Mountain	6,720
2.	Mahogany Mountain	5,680
	WALKER BASIN	
1.(Cal.)	Center Mountain	9,400
2.(Cal.)	Sonora Pass	8,800
3.(Cal.)	Buckeye Forks	6,500
4.(Cal.)	Dunderburg Peak	8,400
5.(Cal.)	Willow Flat	8,250
6.(Cal.)	Buckeye Roughe	7,900
7.(Cal.)	Leavitt Meadows	7,200
8.(Cal.)	Tioga Pass	9,900
	TAHOE BASIN	
1.(Cal.)	Lake Lucille	6,400
2.(Cal.)	Rubicon # 1	8,100
3.(Cal.)	Hagens Meadow	8,000
4.(Cal.)	Frazel Ranch	7,300
5.(Cal.)	Hart Creek	7,000
6.(Cal.)	Richardsons	6,800
7.(Cal.)	Upper Truckee	6,400
8.(Cal.)	Tahoe City	6,250
9.(Cal.)	Rubicon # 2	7,500
10.(Cal.)	Rubicon # 3	6,700
11.(Cal.)	Richardsons # 2	6,500
12.(Cal.)	Echo Summit	7,600
13.	Marlette Lake	8,000
14.	Daggette Pass	7,350
15.	Glenbrook # 2	6,900
16.	Mt. Rose	10,000

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PROGRESS AND NEEDS

1. Stream Gages

The plan of measuring the runoff of all the principal tributaries of the Humboldt has now been accomplished by gages along the main stream or at the outlet of the feeders. The cross-sectional measurement has been planned for all water centers along the river. Stations for the Lamoille and Bishop-Trout Creek areas are still lacking.

The long planned and essential gage at the canyon throat of Marys River will be definitely established this year. The counter-effect of heavy initial water supply and impeded flow should be studied with a view to increasing the net water supply of the Humboldt.

2. Well Measurements

The well measurements in the Humboldt and Lamoille Valleys have now proved so essential in the study of ground water and forecasting of streamflow that all accumulated data are now being tabulated and summarized by the U. S. Geological Survey.

3. Snow Courses

By the cooperation of the U. S. Soil Conservation Service the snow courses in the Humboldt Basin have been improved and the normals revised.

New courses have been laid out at 76 Creek to avoid the danger of entering the upper Marys Basin and in Pahrump Valley to extend the system of snow surveys on Mount Charleston. A snow course should be laid out in Pole Creek in Northeastern Nevada to serve the Salmon Falls Basin and averaged with the course at 76 Creek as a bridge for estimating the snow cover of Marys River. A course has been selected at Virginia Lake in the East Walker Basin as substitute for the windswept course on Dunderberg Peak.

The map of Nevada Snow Survey Courses forming the frontispiece has been revised and expanded by Clyde E. Houston, representative of the Soil Conservation Service for snow surveys in Nevada and Arizona.

4. Precipitation Stations

The U. S. Weather Bureau is cooperating generously in providing seasonal and recording precipitation gages to supplement the snow surveys and provide records of precipitation during the period of runoff. Recording gages will be of special value above the snow line and at the sources of precipitation-supply, where observers are rarely found.

5. Safety

Shelter cabins are being constructed or planned for Baker Creek and Mount Charleston through cooperation of the Soil Conservation and Forest Services for the former and State and Nevada Colorado River Commission for the latter. A shelter will soon be constructed on Trout Creek.

A Tucker Sno-Cat has been purchased by the Soil Conservation Service and was used in the March 1 snow surveys in the Humboldt Basin and for caching supplies in the Eastern Sierra. A similar motor sled has been provided by the Southern California Edison Company for use at Huntington Lake. A light army M-7 is used very successfully by the Central Sierra Snow Laboratory for traversing the peaks near Donner Summit.

Helicopter planes are being tested by the Forest Service in forest management. If they can land and take off in the summer, they will also be tested in winter.

6. Personnel

Clyde E. Houston, though the direct representative of the Soil Conservation Service for Nevada and Arizona, is cooperating intimately with the Nevada Agricultural Experiment Station and sharing in its snow studies. He will carry much of the work of Carl Elges who is still in Service.

7. Reorganization

The Nevada Cooperative Snow Surveys originated in 1919 by recommendation of Governor Emmet D. Boyle and appropriation by the Legislature to the State Engineers, who have been deeply interested in the growth of snow-surveying throughout the years.

The work has been guided by the Forecast Committee consisting of H. P. Boardman, George Devore, and Leigh Sanford but the problems of the Humboldt have been retained by the staff of the Agricultural Experiment Station. Cooperation has expanded. But the State Engineer now feels that a more representative and formal organization should be perfected and larger funds solicited from public and state sources. The alert interest in all information regarding water resources justifies this plan.

PART I. EASTERN SIERRA BASINS

PRE-SURVEYS AND FORECASTS

AT KEY STATIONS

In contrast to the other basins of Nevada, the annual snow-survey and forecast of the Eastern Sierra Basins is postponed until April 1 when the major seasonal flow begins.

To keep in close touch with the progress of snow accumulation, however, monthly surveys are conducted at key stations throughout the winter, and have been tabulated in the following report.

As will be seen, the Yuba, Truckee and Tahoe Basins have between 80 and 87 percent of the April 1 normal but the Carson Basin only 63 percent. Mono Basin at Tioga Pass, however, has 75 percent, indicating that the Walker Basin situated between these two may have a snow cover of approximately 70 percent. In these basins the runoff should correspond closely with the snow cover.

The storage March 1 is ample. Lake Tahoe has 73 percent of capacity, Lake Lahonton of the Truckee-Carson Drainage 80 percent, and Topaz and Bridgeport Reservoirs of the Walker Basin 90 and 93 percent respectively.

Part I. Eastern Sierra

Basin	Snow Course	Altitude of Snow Course	1946 Date of Snow Survey	Depth of Snow Inches	Density % Water	Water Equivalent Inches	Normal April 1 Water Equivalent	% of April 1 Normal	Year 1945 % of April 1 Normal	Year 1945 Date
South Yuba and Crest	Furnace Flat	6600	1/30	92.7	38.9	36.1	(59)	61.2	31.0	1/30
			3/5	109.3	45.2	49.4	(59)	83.7	55.9	2/26
	Fordyce Lake	6500	1/29	89.1	41.3	36.8	(51)	72.2	31.4	1/30
			3/4	97.5	39.7	38.7	(51)	75.9	52.5	2/27
	Soda Springs	6750	12/30	71.7	46.3	33.2	(42)	79.0		
			2/1	71.1	44.9	31.9	(42)	76.0	46.0	2/4
			3/1	84.6	43.1	36.5	(42)	86.9	56.7	2/28
	Donner Summit	6900	12/30	84.9	37.5	31.9	47.8	66.7		
			2/1	82.4	40.2	33.1	47.8	69.2	46.9	2/3
			3/1	97.5	42.0	41.0	47.8	85.8	52.1	2/28
	Ward Creek	7000	3/2	88.2	40.6	35.8	52.7	67.9	60.2	3/4
Truckee	Independence Camp	7000	3/3	66.2	38.1	25.2	(26.5)	95.1	64.5	3/9
	Sage Hen Creek	6500	2/2	46.9	36.2	17.0	(22)	77.3	56.4	2/11
			3/2	54.1	34.8	18.8	(22)	85.5	64.5	3/11
	Truckee #2	6400	2/3	49.5	32.1	15.9	(20)	79.5		
			3/2	46.0	34.8	16.0	(20)	80.0	63.5	3/4
	Donner Lake	5950	12/29	41.8	38.8	16.2	New Course			
			1/31	47.6	39.7	18.9	" "			
			3/1	59.2	36.5	21.6	" "			
	Truckee R.S.	6000	12/29	29.3	28.0	8.2	New Course			
			1/31	33.9	34.2	11.6	" "			
			3/2	38.3	36.3	13.9	" "			

Part 1. Eastern Sierra (Continued)

Basin	Snow Course	Altitude of Snow Course	1946 Date of Snow Survey	Depth of Snow Inches	Density % Water	Water Equivalent Inches	Normal April 1 Water Equivalent	% of April 1 Normal	Year 1945 % of April 1 Normal	Year 1945 Date
Tahoe	Tahoe City	6250	1/3	32.1	32.4	10.4	15.9	65.4		
			1/31	28.2	35.5	10.0	15.9	62.9	29.6	2/4
			2/28	33.5	36.5	12.2	15.9	76.7	36.5	3/1
	Marlette Lake	8000	1/3	58.7	33.4	19.6	27.8	70.5		
			3/3	65.8	38.7	25.5	27.8	91.7	77.3	3/1
	Daggetts Pass	7350	2/2	33.7	31.2	10.5*	16.3	64.4		
						*Incomplete				
			3/9	36.8	35.6	13.1	16.3	80.4	67.5	3/3
	Richardson #1	6500	3/10	30.3	32.3	9.8	(13)	75.4	33.8	3/3
	Richardson #2	6500	2/3	51.1	26.8	13.7	No Normal			
			3/10	45.6	33.3	15.2	" "			
	Echo Summit	7500	12/31	85.4	34.8	29.7	(40)	74.3		
			2/1	87.8	40.2	35.3	(40)	88.2	46.0	1/31
			2/28	104.9	40.0	42.0	(40)	105.0	70.8	3/1
	Upper Truckee	6400	3/10	25.4	40.6	10.3	(11)	93.6		
	Glenbrook #2	6900	3/9	48.5	30.9	15.0	(20)	75.0		
Carson	Blue Lakes	8000	1/31	74.6	37.2	27.8	48.1	57.8	57.4	2/4
			3/1	85.8	37.6	32.3	48.1	67.2	66.3	3/1
	Carson Pass	8600	1/21	59.1	40.4	23.9	(48)	50.0	38.5	1/25
			2/22	69.3	41.2	28.5	(48)	59.4	70.2	2/23
Mono	Tioga Pass	9900	3/2	58.0	39.7	23.0	(31)	74.2	88.4	2/28

Reservoir Storage March 1

Lake Tahoe, Lake Level	6227.38	ft.
Maximum Permitted	6229.1	ft.
Lake Lahonton, Storage	229,406	acrefeet
Capacity	286,000	acrefeet

Topaz Reservoir, Storage	55,918	acrefeet
Capacity approx.	60,000	acrefeet
Bridgeport Reservoir	39,541	acrefeet
Capacity approx.	42,500	acrefeet

PART II. HUMBOLDT RIVER BASINS
EASTERN AND SOUTHERN NEVADA
NEVADA NATIONAL WILDLIFE
REFUGES

Summary Forecast of Streamflow

March 1, 1946

1. Humboldt Basins

On the basis of revised snow-survey normals (which are 20 percent lower than previously) the snow cover of the North and South Feeders of the Upper Humboldt on March 1 was 102.7 percent of normal for each or approximately the same as last year.

The Little Humboldt-Quinn River area had a snow cover of 102.5 percent.

In the Reese River Basin the snow cover was only 65.2 percent of normal or 60 percent of last year's cover, but the winter precipitation at Austin (Nov-Feb.) was 92.6 percent of normal or only 10 percent lower than last year. The temperature was only slightly below normal, yet low snow seems to be lacking.

The flow of the streams of the Humboldt Basin during the March-July runoff may be subject to excess runoff of 40 percent of normal if the precipitation during this period should approximate 200 percent of its normal. The reverse also may be true.

A still more potent factor on the lower valley streams, which can be detected March 1 is the height of the water table indicated by the copiousness of the winter runoff and the height of the water in the wells.

All feeders above their canyon mouths are practically unaffected. These are the upper Marys, North Fork, Secret and Starr Creeks, Lamoille, South Fork, and Martin Creek.

These streams below their canyon mouths where the valleys are alluvial and meadows are abundant may suffer an increase of 60 percent of the March-July normal, but the main Humboldt above Palisade may suffer an extreme of 100 percent due to water that can not be absorbed by the soil.

Since the winter runoff of the main Humboldt was 174 percent of normal and the water table is even higher than last year, the probable effect of high water in the soil will offset any shrinkage due to lack of precipitation during runoff in all streams below canyon mouths but in the case of normal precipitation may increase the runoff 60 percent above the percentage of the snow cover to 160 percent. The Humboldt at Palisade may even flow 100 percent above it or a total of 200 percent.

The upper streams above the alluvial valleys will flow at 100 percent represented by the snow cover except that they will be subject to excess or deficiency of precipitation during runoff, which can reach to 40 percent of normal March-July runoff.

Paradise Valley because of its apparently high water table should have its valley streams flowing far in excess of the 102 percent of snow cover in its basin.

In the Reese River Basin the snow cover is only 65.2 percent of normal or 60 percent of last year's cover, but the winter (Nov-Feb.) precipitation at Austin was 92.6 percent of normal or only 10 percent lower than last year. The temperature was only slightly below normal, yet low snow seems to be lacking.

FORECAST TABLE
(Percent of Normal Mch-July)

	Probable Runoff with Normal Precipitation
Upper Humboldt	
Feeders above alluvial valleys	100
Feeders below alluvial valleys	160
Main Humboldt at Palisade	200 = 430,000 A.F.
Lower Humboldt	
1. Little Humboldt	
Upper Martin Creek	100 = 20,000 A.F.
Lower Martin Creek and Paradise Valley	160
2. Reese River	
Low snow lacking, but high snow 85 percent of last year or	90
3. Rye Patch Reservoir	
Storage 160,720 A.F.; capacity 178,100 A.F.	
Pitt-Taylor Reservoir 14,340 A.F.	

2. Eastern Nevada

The snow cover of Eastern Nevada is only 64 percent of normal or 60 percent of last year. This corresponds with the winter precipitation of 51 percent at Ely. The snow cover in Steptoe Valley is 67 percent of last season but in Baker Creek only 57 percent.

3. Southern Nevada

The snow drought seems to have become even worse in Southern Nevada. The snow cover on Mount Charleston is only 44.8 percent of normal or 52 percent of last year's snow storage. The winter precipitation of 41.9 percent at Las Vegas corresponds closely with it.

4. Wildlife Refuges

The snow cover at Sheldon and Ruby Lake Wildlife Refuges is almost an exact duplicate of the snow cover last year. The winter precipitation was 73.1 and 66.7 percent respectively.

MARCH 1 SNOW SURVEY DATA
1. UPPER HUMBOLDT BASIN

Temperature departure Nov-Feb. Elko (5,077 ft.) -2.6°F
Mean temperature above freezing +7.2°F

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent	Normal water equivalent Mar. 1	Percentage of Mar. 1 normal		Seasonal precipitation Percentage of normal at U.S.W.B. stations Nov-Feb.
Northern Feeders									
Marys River									
Bear Creek	7,800	Feb. 27	49.9	34.5	17.2	16.1	106.8)	-	Jarbidge-Mala
Fox Creek	6,800	Feb. 28	31.3	30.0	9.4	8.6	109.3)	103.5	Vista (6,100-
Marys River	8,000	Mar. 8	53.7	31.5	16.9	17.9	94.4)		5,585 ft.)
									5.78 in.
Marys River-North Fork									
76 Creek	7,100	Mar. 8	42.5	31.3	13.3				
Big Bend	7,000	Mar. 7	34.8	29.0	10.1	9.0	112.2)	109.8	
Gold Creek	6,600	Mar. 7	28.2	25.9	7.3	6.8	107.4)		
North Fork									
Jack Creek	7,250	Mar. 1	30.8	31.5	9.7	10.2	95.1)		North Fork-
Jack Creek	6,800	Mar. 2	15.8	32.9	5.2	5.2	100.0)		Tuscarora-Owyhee
Rodeo Flat	6,800	Mar. 2	32.0	29.7	9.5	10.5	90.5)	94.3	(6,500-5,400 ft.)
Fry Canyon	6,700	Mar. 1	31.4	28.0	8.8	9.6	91.7)		(Normal 5.25 in.)
Tremewan Ranch	5,700	Mar. 7	7.2	34.7	2.5	3.0	80.3		4.43+ in.; 84.4+
Susie-Maggie Creeks									
Taylor Canyon	6,200	Mar. 3	20.2	33.2	6.7	6.5	103.1)	103.1	Tuscarora (6,400
									ft.) (Normal 6.02
									in.) 4.79 in; 79.6
AVERAGE OF NORTHERN FEEDERS						Higher Levels	102.7		82.0+
						Lower Levels	80.3		

MARCH 1 SNOW SURVEY DATA

1. UPPER HUMBOLDT BASIN (Continued)

Elevation feet		Date	Snow depth inches	Density percent	Water equivalent	Normal water equivalent Mar. 1	Percentage of Mar. 1 normal		Seasonal Precipitation Percentage of normal at U.S.W.B. stations Nov-Feb.
Southern Feeders Trout-Starr-Secret Creeks									
Trout Creek	8,500					20.2	)	100.4 Inc.	Arthur-Wells
Trout Creek	6,900					6.2	)		(6,500-5,633 ft.)
							)		(Normal 5.71 in.)
Dorsey Basin	8,100	Mar. 5	39.4	28.2	11.1	11.0	100.9)		4.97 in.; 87.0
Dry Creek	6,500	Mar. 5	18.8	31.4	5.9	5.9	100.0)		
Ryan Ranch	5,800	Mar. 4	2.1	41.6	0.9	2.4	37.5		
Lamoille-Rabbit Creeks									
Lamoille	8,700	Mar. 4	72.0	41.8	30.1	21.3	141.3)	110.9	Lamoille-Elko
Lamoille	8,700+	Mar. 4	62.1	39.8	24.7	22.5	112.0)		(6,290-5,077 ft.)
Lamoille	8,000	Mar. 5	56.3	30.9	17.4	17.1	101.8)		(Normal 5.14 in.)
Lamoille	7,700	Mar. 5	46.7	27.2	12.7	12.5	101.6)		4.99 in.; 97.0
Lamoille	7,300	Mar. 4	38.4	26.0	10.0	9.6	104.1)		
Lamoille	7,100	Mar. 3	35.1	27.3	9.6	9.2	104.3)		

+Cross Course

MARCH 1 SNOW SURVEY DATA

1. UPPER HUMBOLDT BASIN (Continued)

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent Mar. 1		Normal water equivalent Mar. 1	Percentage of Mar. 1 normal		Seasonal precipitation Percentage of normal at U.S.W.B. stations Nov-Feb.
Southern Feeders (Cont.)										
South Fork-Ruby Lake										
Corral Canyon	8,500	Mar. 1	53.0	34.5	18.3		14.1	129.8)		Jiggs** -Ruby Lake
Green Mountain	8,000	Mar. 2	40.8	31.4	12.8		13.7	93.4)	99.3	(5,450-6,200 ft.)
Harrison Pass #2	7,400	Feb. 28	19.8	23.2	4.6)	4.5	5.9	74.6)		(Normal Jiggs 5.04 in.)
Harrison Pass #1	6,600	Feb. 28	18.5	23.8	4.4)					Ruby Lake 3.17 in.
										Jiggs 4.53 in.; 89.8
Hager Canyon	8,500	Mar. 8	49.7	36.0	17.9		18.2	98.4)	98.9	
Cave Creek	7,000	Mar. 8	40.4	38.9	15.7		15.8	99.4)		

AVERAGE OF SOUTHERN FEEDERS — Higher Levels 102.7*; Lower Levels 37.5 — 91.5*

*The average for the Southern Feeders is computed by weighting the three groups of stations representing South Fork, Lamoille Creek, and Starr Creek on the basis of 2, 1 and 1/2 representing their relative contributions to the flow of the main Humboldt.

AVERAGE OF UPPER HUMBOLDT — Higher Levels 102.7; Lower Levesl 58.9 — 86.8

**Normal based on Hylton

[illegible]

MARCH 1 SNOW SURVEY DATA

11. LOWER HUMBOLDT BASIN

Temperature departure Nov-Feb. Winnemucca -0.7°F
Mean max. temperature above freezing +12.2°F

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent inches	Normal water equivalent inches	Percentage of Mar. 1 normal		Seasonal precipitation Percentage of normal at U.S.W.B. stations Nov-Feb.
Rock Creek-Little Humboldt									
Midas	7,200	Mar. 8	16.8	43.1	7.12	6.6	109.1		
Little Humboldt Basin									
Lamance Creek	6,000	Mar. 5	30.9	33.3	10.3	10.7	96.3		Paradise-Orovada
Granite Peak	7,800	Mar. 3	40.2	31.0	13.0	9.5	136.8		(4,650-4,300 ft.
Martin Creek R.S.	6,700	Mar. 4	26.9	25.0	6.7	7.2	93.1	95.9	(Normal 4.10 in.)
Upper Buckskin	7,200	Mar. 4	19.8	34.1	6.8	10.2	66.7		3.75 in.; 91.4
Lower Buckskin	6,700	Mar. 4	25.8	28.0	7.1	8.2	86.6		
AVERAGE LITTLE HUMBOLDT BASIN							102.5		

Reese River Basin

Temperature departure Nov-Feb. Austin -0.8°F
Mean max. temperature above freezing +11.1°F

Big Creek									
Upper Big Creek	8,000	Mar. 3	29.8	31.9	9.5	6.7	141.8		Austin (6,594 ft.)
Cabin Course (Middle)		Mar. 6	11.2	31.2	3.5	3.0	116.7		(Normal 4.37 in.)
Camp Ground (Lower)		Mar. 6	Trace			3.0	0.0	65.2	4.05 in.; 92.6
Reese River									
Upper Corral	8,500	Mar. 5	16.6	27.7	4.6	6.8	67.6		
Lower Corral	7,500	Mar. 5	No Snow			3.3	0		
AVERAGE REESE RIVER BASIN							65.2		92.6

MARCH 1 SNOW SURVEY DATA

EASTERN NEVADA

Temperature departure Nov-Feb. Ely (6,257 ft.) -0.6°F
Mean temperature above freezing +8.1°F

	Elevation feet	Date	Snow depth Inches	Density percent	Water equivalent Mar. 1	Normal water equivalent in. Mar. 1	Porcentage of Mar. 1 normal		Season precipitation Percentage of normal at U.S.W.B. stations Nov-Feb.
Steptoe Valley									
Murray Summit	7,250	Mar. 4	10.5	29.5	3.1	4.2	73.8		Ely (6,257 ft.) (Normal 3.53 in.) 1.80 in.; 51.0
Baker Creek									
Baker Creek #3	9,230	Mar. 1	34.1	26.9	9.2	13.0	70.8)		Lehman Caves Nat. Mon.
Baker Creek #2	8,950	Mar. 1	34.1	28.0	9.6	19.4	49.4)	54.7	(7,200 ft.)
Baker Creek #1	7,950	Mar. 1	13.2	24.1	3.2	7.3	43.8)		1.84 in.
AVERAGE EASTERN NEVADA							64.2		51.0

SOUTHERN NEVADA

Charleston Mountain

Temperature departure Nov-Feb. Las Vegas A.P. (1,876 ft.) +0.1°F
Kyle Canyon Ranger Station (7,165 ft.)
Mean temperature above freezing Las Vegas A.P. +29.8°F;
Kyle Canyon R.S. +14.7°F Inc.

Kyle Canyon	8,200	Feb. 28	19.8	31.8	6.3	13.2	47.7)		Kyle Canyon
Rainbow Canyon	7,800	Mar. 4	21.4	33.2	7.1	14.3	49.7)	44.8	(7,165 ft.)
Lee Canyon	9,000	Mar. 2	21.0	30.0	6.3	14.0	45.0)		4.03 in. Inc.
Lee Canyon	8,300	Mar. 1	13.3	33.1	4.4	12.2	36.7)		Las Vegas Airport
Clark Canyon	9,000	Mar. 2	16.4	29.8	4.9				(1,876 ft.)
Trough Springs	8,500	Feb. 27	9.5	30.6	2.9				(Normal 1.67 in.) 0.70 in.; 41.9
AVERAGE SOUTHERN NEVADA							44.8		

WILDLIFE REFUGES

Sheldon National Antelope Refuge (Northern Washoe County)

Temperature departure Nov-Feb. -1.6°F

Mean temperature above freezing +5.9°F

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent in. Mar. 1	Normal water equivalent Mar. 1 inches	Percentage of Mar. 1 normal	Seasonal precipitation Percentage of normal at U.S.W.B. stations Nov-Feb.
Bald Mountain	6,720	Feb. 28	10.7	29.0	3.1	4.8	64.6	Sheldon Antelope Refuge (6,500 ft.) (Normal 4.77 in.) 3.49 in.: 73.1

Ruby Lake National Wildlife Refuge (Southern Elko County)

Temperature departure Nov-Feb. Elko (5,077 ft.) -3.9°F

Ruby Lake (6,012 ft.)

Mean temperature above freezing -3.1°F

	Elevation feet	Date	Snow depth inches	Density percent	Water equivalent in. Mar. 1	Normal water equivalent Mar. 1 inches	Percentage of Mar. 1 normal	Seasonal precipitation Percentage of normal at U.S.W.B. stations Nov-Feb.
Hager Canyon	8,500	Mar. 8	49.7	36.0	17.9	18.2	98.4 } 98.9	(Arthur 6,500 ft.)
Cave Creek	7,000	Mar. 8	40.4	38.9	15.7	15.8	99.4 }	(Normal 7.92 in.) 5.28 in.; 66.7 (Ruby Lake 6,200 ft.) 1.58 in. Inc.

Comparison of March 1 Snow-Survey Data
1939 - 1946
Water Equivalent Only

Courses	Elevation feet	1946	1945	1944	1943	1942	1941	1940	1939
1. Upper Humboldt Basin:									
Northern Feeders									
Marys River									
Bear Creek	7,800	17.2	13.4	14.3	22.5	18.3	14.2	15.3	16.6
Fox Creek	6,800	9.4	6.9	9.5	9.6	9.8	7.6	5.7	8.7
Marys River	8,000	16.9		15.4	24.0	17.7		14.7	16.5
Marys River-North Fork									
76 Creek	7,100	13.3							
Big Bend	6,700	10.1	8.1	6.4	16.3	10.2	9.9	6.4	7.2
Gold Creek R.S.	6,600	7.3	6.3	4.0	10.9	8.1	6.2	4.7	4.5
North Fork									
Jack Creek	7,250	9.7	10.7	9.4	12.3	11.5	9.4	8.9	12.9
Jack Creek	6,800	5.2	6.6	4.9	3.3	6.7	4.2	1.3	7.9
Rodeo Flat	6,800	9.5	10.0	10.1	12.5	11.4	10.5	7.5	11.0
Fry Canyon	6,700	8.8	8.6	8.2	10.7	10.5	9.2	6.5	10.0
Tremewan Ranch	5,700	2.5	2.2	2.9	2.3	4.1	3.2	0	2.4
Susie-Maggie Creek									
Taylor Canyon	6,200	6.7	7.6	4.2	4.4	8.5	8.3	3.0	5.6
Southern Feeders									
Trout-Starr-Secret Creeks									
Trout Creek	8,500		21.1	11.9	24.1	17.5	24.9	19.7	19.6
Trout Creek	6,900		6.4	0	4.8	9.0	6.5	7.4	5.0
Dorsey Basin	8,100	11.1	10.1	12.4	10.1	14.0	9.6	11.3	8.1
Dry Creek	6,500	5.9	5.8	5.9	4.8	7.6	6.6	3.2	3.6
Ryan Ranch	5,800	0.9	3.1	4.0	0.8	4.3	0.4	0.5	1.6
Lamoille-Rabbit Creeks									
Lamoille Canyon	8,700	30.1	22.1	21.7	31.6	23.8	22.7	20.4	23.4
Lamoille Canyon	8,700+	24.7	19.1	22.5	29.1	23.7	21.3	19.4	22.7
Lamoille Canyon	8,000	17.4		16.1	21.0	18.5	15.3	14.7	
Lamoille Canyon	7,700	12.7	12.4	13.0	13.7	13.3	11.2	11.8	12.6
Lamoille Canyon	7,300	10.0	10.3	10.5	12.0	12.7	9.4	9.1	9.4
Lamoille Canyon	7,100	9.6	10.5	9.3	11.7	12.4	10.2	7.4	8.6
South Fork-Ruby Lake									
Corral Canyon	8,500	18.3	18.1	16.2	15.8	15.8	13.2	14.4	16.1
Green Mountain	8,000	12.8	12.3	12.6	12.2	14.1	13.7	13.1	15.3
Harrison Pass #2	7,400	(4.5)	6.9	6.6	2.6	7.7	6.0	4.9	5.3
Harrison Pass #1	6,600		5.9	5.0	2.3	6.5	5.4	4.6	5.1
Hagar Canyon	8,500	17.9	17.0		19.1	21.0	14.8	19.3	
Cave Creek	7,000	15.8	15.5		14.6	16.2	0	12.4	

Comparison of March 1 Snow-Survey Data
1939 - 1946

Courses	Elevation feet	1946	1945	1944	1943	1942	1941	1940	1939
2. Lower Humboldt Basin									
Rock Creek-Little Humboldt									
Midas	7,200	7.2	7.9	4.8	5.2	9.2	7.3	5.2	
Little Humboldt Basin									
Lamance Creek	6,000	10.3	9.6	7.0	13.6	10.4	11.9	9.9	8.7
Granite Peak	7,800	13.0	11.4	7.4	18.9	13.7	15.7	15.0	12.8
Martin Creek R. S.	6,700	6.7	6.6	3.8	9.5	8.3	7.8	6.8	5.8
Upper Buckskin	7,200	6.8	14.2		14.9	11.2	13.4	10.8	8.0
Lower Buckskin	6,700	7.1	8.8		9.3	7.6	8.4	5.8	6.7
Reese River Basin									
Big Creek									
Upper Big Creek	8,000	9.5	9.4	7.3	3.4	6.6			
Cabin Course (Middle)		3.5	4.6	1.4	1.0	4.9			
Camp Ground (Lower)		T	5.1	2.0	T	4.7			
Reese River									
Upper Corral	8,500	4.6	6.9	9.8	5.4	5.0			
Lower Corral	7,500	0	3.5	3.9	2.7	3.0			
3. Eastern Nevada									
Steptoe Valley									
Murray Summit	7,250	3.1	4.6	5.2	5.0	3.7			
Baker Creek									
Baker Creek #3	9,230	9.2			13.0				
Baker Creek #2	8,950	9.6	14.5	34.5	12.8	15.6			
Baker Creek #1	7,950	3.2	7.9	10.0	6.0	5.3			
4. Southern Nevada									
Charleston Mountain									
Kyle Canyon	8,200	6.3	9.9	12.9	15.7	8.8	18.9		
Rainbow Canyon	7,800	7.1	9.5	12.2	16.7	10.5	22.4		
Lee Canyon	9,000	6.3	13.3	8.9	17.4	9.9	20.6		
Lee Canyon	8,300	4.4	13.6	9.3	13.9	7.8	16.5		
Clark Canyon	9,000	4.9							
Trough Springs	8,500	2.9							
5. U.S.Wildlife Refuge:									
Sheldon Antelope Refuge									
Bald Mountain	6,720	3.1	3.3	3.4	7.7	6.2	5.9		
Ruby Lake Wildlife Refuge									
Hagar Canyon	8,500	17.9	17.0		19.1	21.0	14.8		
Cave Creek	7,000	15.7	15.5		14.6	16.2	0		

Winter Precipitation
(U. S. Weather Bureau)

1. Upper Humboldt Basin

Northern Feeders	Marys River		North Fork		Maggie-Susie Creeks
Stations	Jarbidge	Mala Vista	: North Fork	Owyhee	Tuscarora
Elevation (Ft. Alt.)	(6,100)	(5,585)	(6,500)	(5,400)	(6,400)
November	2.09	0.70	1.17	1.47	1.89
December	2.86	1.24	2.02	1.54	2.25
January	2.31	0.30	0.85	0.94	
February	1.92	0.15		0.50	0.65
Total	9.18	2.39	4.04 Inc.	4.45	4.79 Inc.
Weather Bureau Normal (Nov-Feb.)			4.64	5.10	6.02
Seasonal Percentage of Normal			87.1 Inc.	87.3	79.6 Inc.
Area Percentage				84.7 Inc.	
Northern Feeders			84.7 Inc.		

Southern Feeders	Trout-Starr-Secret Creeks		Lamoille-Rabbit Creeks		South Fork	
Stations	Wells	Arthur	: Lamoille	Elko	Jiggs*	Ruby Lake
Elevation (Ft. Alt.)	(5,663)	(6,500)	(6,290)	(5,077)	(7,081)	(6,200)
November	2.13	1.66	2.24	0.96	1.42	0.30
December	1.13	2.02	1.59	1.94	1.63	
January	0.92	0.85	1.46	0.64	0.88	0.69
February	0.45	0.85	0.89	0.28	0.69	0.59
Total	4.63	5.38	6.18	3.82	4.62	1.58
Weather Bureau Normal (Nov-Feb.)	4.00	7.38	6.25	4.43	5.04	
Seasonal Percentage of Normal	115.8	72.9	98.9	86.2	91.7	
Area Percentage	94.4		92.6		91.7	
Southern Feeders		92.3**				

*Continuation of Hylton
Normal based on Hylton
**See Footnote p. 11

Winter Precipitation
(U. S. Weather Bureau)

2. Lower Humboldt Basin

Stations	Paradise Valley	Orovada	Austin	Battle Mt.	Winnemucca	Rye Patch Dam	Lovelock
Elevation (Ft. Alt.)	(4,650)	(4,300)	(6,594)	(4,513)	(4,287)	(4,161)	(3,977)
November	0.92	1.43	1.25	0.57	1.26	0.78	0.17
December	1.97	2.08	1.29	0.97	1.51	0.64	0.69
January	0.55		1.06	0.34	0.44	0.10	0.03
February	0.29	0.26	0.47	0.20	0.36	0.18	0.16
Total	3.73	3.77	4.07	2.08	3.57	1.70	1.05
Weather Bureau Normal (Nov-Feb.)	4.10	4.09	4.28	2.54	3.70		1.71
Seasonal Percentage of Normal	91.0	92.2	95.1	81.9	96.5		61.4
Area Percentage	91.6		95.1		89.2		61.4

	3. Eastern Nevada		4. Southern Nevada	5. Wildlife Refuges	
Stations	Ely	Lehman Caves Nat'l. Mon.	Kyle Canyon R. S.	Ruby Lake	Sheldon
Elevation (Ft. Alt.)	(6,257)	(7,200)	(7,165)	(6,200)	(6,500)
November	0.87	0.73	0.13	0.30	1.96
December	0.23	0.29	3.88		0.68
January	0.62	0.30		0.69	0.38
February	0.08	0.52	0.98*	0.59	0.47
Total	1.80	1.84	4.99	1.58	3.49
Weather Bureau Normal (Nov-Feb.)	3.53				4.73
Seasonal Percentage of Normal	51.0		(Las Vegas A.P. 41.9)	(Arthur 72.9)	73.8

*Partly estimated

Winter Runoff 1942-1943-1945-1946
(Acrefeet)

	Humboldt River at Palisade				Martin Creek at U.S. Gaging Point				
	1942-1943	1943-1944	1944-1945	1945-1946	Normal	1942-1943	1943-1944	1944-1945	1945-1946	Normal
Nov.	5,530	3,280	3,780	9,510	4,600	682		582	543	740
Dec.	13,400	4,340	5,640	9,220	5,400	1,140		538	944	750
Jan.	35,880	4,100	6,920	12,770	6,600	7,010		764	762*	830
Feb.	70,520	6,627	27,680	18,540	12,200	6,090		4,000	778**	1,380
	125,330	18,347	44,010	50,040	28,800	14,922	2,190	5,884	3,027	3,700
	(435.2%)	(63.7%)	(152.8%)	(173.8%)		(405.5%)	(59.5%)	(159.9%)	(81.8%)	

* Partly estimated
** Estimated from one measurement and temperature record

Winter Temperature Departure from Normal °F

	Elko				Winnemucca			
	1942-1943	1943-1944	1944-1945	1945-1946	1942-1943	1943-1944	1944-1945	1945-1946
Nov.	-1.1	-0.4	-10.9	-2.5	+1.4	+1.4	+1.5	-0.1
Dec.	+6.0	+4.0	-13.8	-2.1	+3.6	+1.4	0	+1.0
Jan.	+5.4	-9.5	- 1.1	-2.7	+3.4	-6.0	+0.2	+2.0
Feb.	+0.2	-2.3	+ 2.1	-3.0	+3.7	-1.6	+2.9	0
Avg.	+2.6	-2.0	-5.9	-2.6	+3.5	-1.2	+1.2	+0.7

Mean Max. Temperature during Winter above 32°F (Freezing)

	Elko				Winnemucca			
	1942-1943	1943-1944	1944-1945	1945-1946	1942-1943	1943-1944	1944-1945	1945-1946
Nov.	+3.0	+9.2	+2.8	+12.9	+7.8	+11.8	+10.4	+15.9
Dec.	-0.2	+5.4	-8.5	+ 4.0	+1.6	+ 5.8	+ 8.5	+ 7.7
Jan.	-3.6	-1.2	+2.5	+ 2.8	0.0	+ 1.6	+ 8.6	+10.5
Feb.	-2.2	+3.2	+9.5	+ 9.2	+7.2	+ 4.4	+13.2	+14.5
Avg.	-0.8	+4.2	+1.6	+ 7.2	+4.2	+ 5.9	+10.2	+12.2

Well Measurements
March 1

The March 1 level of the Humboldt Valley wells is approximately the same as of that date in 1945, but the Lamoille Valley wells are lower than any year since 1941.

Upper Humboldt Valley
(Average of 7 Wells 11.62 ft.)*

To Water Level:

	7 Wells	5 Wells
1941	12.90 ft.	15.80 ft.
1942	9.19 "	11.20 "
1943	9.97 "	12.22 "
1944		10.50 "
1945	11.09 "	12.61 "
1946	10.7 "	12.26 "

*For 1941 to 1944 approximately April 1

Lamoille Valley
(Average of 5 Wells 4.24 ft.)

To Water Level:

	5 Wells
1935	5.03 ft.
1936	3.72 "
1937	3.57 "
1938	4.50 "
1939	3.92 "
1940	4.50 "
1941	5.70 "
1942	3.80 "
1943	3.40 "
1944	4.14 "
1945	3.30 "
1946	4.20 "

Lamoille Valley Wells

Low Water Departure (ft.) from Normal (Avg. of 12 Yrs. '35-'46

Well	Depth	L.W. Normal	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Charles	26.4	23.3	-3.1	-3.1	-2.2	+1.0	+2.3	+1.3	-2.7	+2.8	+3.3	+0.6	+2.2	+2.2
Church	15.6	14.2	-1.4	-1.4	-1.4	-1.4	+2.2	-1.4	+1.2	+3.2	+2.7	+1.0	+1.5	+2.8
Case	27.5	20.3	-7.2	-7.2	-1.7	-1.7	+3.8	+3.6	-7.2	+4.3	+9.8	+3.9	+7.0	+7.5
Patterson	13.4	7.1	-5.5	-1.1	-1.6	-1.7	+2.4	-0.5	-0.4	+2.3	+3.6	+2.4	+2.9	+3.7
McKinney Gate	4.5	2.9	0.0	-0.7	-0.6	+0.6	-0.4	-0.2	+0.9	-0.1	+0.4	+0.5	+1.5	+0.8
Lytton Lane 1	5.1	4.5	-0.9	-0.2	-0.5	+0.8	+0.2	-0.3	+0.5	+0.1	+0.2	-0.3	+1.2	+0.3
Lytton Lane 2	6.9	5.5	-1.3	+1.0	-1.4	+0.4	-0.1	-0.1	+0.9	+0.3	+0.3	+0.4	+1.4	+0.9

The table will ultimately include all of the wells of both valleys

FORECAST

The final forecast of streamflow for the season must depend upon the two snow surveys of March 1 and April 1 which are designed to give the basic snow cover at the beginning of March, when the shallow snow of the Great Basin mountains begins to melt, and the residual snow cover at the beginning of April, which should indicate the probable span of streamflow. In the present or earlier bulletin, therefore, only the general forecast based on the initial snow cover will be made.

1. Factors

The chief factors upon which the general accuracy of the forecasts must be based are the snow cover (or winter precipitation) and the precipitation during the earlier portion of the period of runoff when the snow cover is most widely extended. But on all streams flowing through meadows and alluvial valleys, where the water table fluctuates, or on streams affected by diversions there are also the factors of soil moisture and diversions that can be determined at the beginning of the runoff season.

(a) Diversions

Unfortunately most of the gaging stations in the Humboldt Basin are below diversions. The main station at Palisade by which forecasting has been judged is below 170,000 acres of irrigated land which absorb 70 percent of the original supply of the river, leaving normally only 215,000 acrefeet for the lower Humboldt. Since the water is not closely apportioned according to the snow supply and the amount of diversion does not greatly change, the water residue below diversions varies at a greater percentage rate than the snow cover. For example, a change of 10 percent in snow cover on the Humboldt, where diversions are high, may cause a change of 34 percent in normal runoff at Palisade.

The following table will illustrate:

Diversion Effect on Main Humboldt

	Snow Cover		Diversion for Irrigation A.F.	Residual Water at Palisade	
	Percent	Orig. Water Supply A.F.		Acre-feet	Percent of Normal
Normal	100	725,000	510,000	215,000	100
	90	652,500	510,000	142,500	66.3
	110	797,500	510,000	287,500	133.7

Last year and this year the snow cover was identical and by the revised normals last year's snow like this was normal. The correction factor need not therefore be applied to the forecast of either.

(b) Water Table

As will be seen by the appended discussion of the excessive flow of the Humboldt in 1944-45, the factor of water-table should be applied to all estimates of flow below meadows and alluvial valleys. The departure of the water-table from normal can be determined qualitatively by the winter runoff and the height of water in the wells adjusted for temperature.

Quantitatively the factor varies with the size of the meadow or alluvial areas. In 1944-45 under possible exaggeration by the double-normal precipitation, the water-table factor was 60 percent of normal on the lower reaches of the feeders of the Humboldt but 100 percent on the main Humboldt itself at Palisade. On the mountain slopes of the feeders, where the soil mantle is shallow or steep, the factor of water table obviously is missing. Since winter runoff and height of the water are much the same as last year, the same factors are experimentally proposed for this.

(c) Precipitation during Runoff

On the basis of last year's double-normal precipitation, the factor for 100 percent excess in March-July precipitation is 40 percent of the March-July runoff. This factor naturally applies to the earlier portion of the period when the snowfields are widest in extent. In the Central Sierra the factor for April-May has been estimated by Dr. H. Landsberg at 20 percent.

2. Basic Data

The following basic data with adjustments in factors represent the trend and probable quantity of the runoff:

A. Precipitation and Snow Cover

I. Upper Humboldt Basin
(Percentage of Normal)

(a) Winter Precipitation and Snow Cover March 1

Northern Feeders	Precip.	(Nov.	Feb.)	82.0+;	Snow Cover	(Mch.	1)	102.7
Southern Feeders	"	"	"	91.5;	" "	"	"	102.7
Upper Humboldt	"	"	"	86.8;	" "	"	"	102.7

(b) Winter Temperature (Nov.-Feb.) was consistently below normal, with an average departure of -2.6°F.

(c) Winter Runoff at Palisade 173.8; Runoff double normal during Nov.-Jan. but 150 percent of normal in February.

(d) Well Measurements (feet above normal)
Humboldt Valley +0.92 ft.
Lamoille Valley +0.04 ft.

Estimated effect at Palisade 100 percent of normal, but 60 percent on the lower reaches of the feeders. Bared, however, on last year when double March-July precipitation occurred.

(e) Estimated March-July runoff at Palisade 102.7 percent expanded to 200 percent because of height of water table. Normal 215,000 A.F. (Mean Median 203,300 A.F.). Probable runoff (a) Mch.-July 430,000 A.F.; (b) Mch.-Sept. 441,400 A.F.

II. Lower Humboldt Basin
(Percentage of Normal)

1. Little Humboldt
(a) Winter Precipitation and Snow Cover Mar. 1
Precipitation (Nov.-Feb.) 91.4; Snow Cover (March 1) 102.5
(b) Winter Runoff of Martin Creek 81.8
(c) Estimated Runoff Mch.-July 102.5 percent. Normal 20,320 A.F. (Mch.-July); 21,440 (Mch.-Sept.). Probable runoff Mch.-July 20,830 A.F; Mch-Sept. 22,270 A.F. But probable runoff in alluvial Paradise Valley 160 percent of Valley normal.

2. Reese River

Winter Precipitation (Austin) 92.6
Low snow lacking but high snow 90 percent of normal.

Rye Patch Reservoir contains 160,720 A.F. or 90 percent of its capacity of 178,100 A.F.

The Pitt-Taylor Reservoirs now have 14,340 A.F. stored in a usable capacity of 26,000 A.F. Reservoir No. 1 has 7,850 A.F. and No. 2, 6,490 A.F.

Escess or deficiency of March-July precipitation may increase or diminish these estimates by a possible maximum of 40 percent of normal.

III. Eastern Nevada

The Nov.-Feb. precipitation at Ely is only 51.0 percent of normal and the snow cover is 64 percent of normal or 60 percent of last year.

IV. Southern Nevada

The precipitation at Las Vegas Airport for Nov.-Feb. has been only 41.9 percent of normal, and the snow cover only 44.8 percent of normal or 52 percent of last year's snow storage.

V. Wildlife Refuges

1. Sheldon Antelope Refuge

The snow cover at Bald Mountain is practically identical in water equivalent with last year though the density is slightly greater. The mean depth is 10.7 in. The percentage of the snow cover is estimated at 64.6 and the winter precipitation at 73.1. Unfortunately lack of personnel and distance from headquarters has caused the discontinuance of the course on Mahogany Mountain.

2. Ruby Lake Refuge

The water equivalent of the snow cover is again practically the same as last year but the density is 8 percent higher or 36.0 to 38.9 percent. The average snow depth at the courses is 40 to 50 inches. The estimated percentage of normal is 98.9 but the winter precipitation at Arthur is only 66.7 percent of normal.

3. Analysis of Runoff 1944-45.

The desire to determine the potency of the high water table in the runoff of March-July 1945 and its area of activity seemed at first to have been thwarted by the almost equally potent factor of heavy precipitation that prevailed throughout the period. Except for the exaggeration that may have been caused by the addition of the excess precipitation to the high water table, it seems possible to separate the two factors and determine the limitations of area of the former.

The weather-elements and runoff for the season of March-September are given in the following table. The precipitation during runoff is confined to Elko, Lamoille, and Wells and the temperature to Elko.

1. Weather and Runoff of the Main Upper Humboldt River
March-September 1945

Period	Snow Cover By Revised Normals %	Precip. at Elko, Lamoille Wells In.	Precip. %	Temp. at Elko Departure oF	Runoff at Palisade Normal A.F.	Acre-feet	%
March 1	102.8						
March		2.64	163.2	-4.8	32,600	44,500	136
April		1.07	88.7	-5.7	47,200	92,180	195
May		2.95	233.9	-1.0	55,500	166,300	305
June		2.60	339.6	-6.6	60,400	155,400	257
July		1.87	118.4	+0.3	20,300	73,880	364
August		1.23	201.6	-0.6	3,600	10,020	278
September		0.59	126.6	-2.3	2,100	3,670	175
March-July	102.8		188.8		215,000	529,400	246
Previous Nov-Feb.					28,800	43,370	151

(2). Weather and Runoff of Martin Creek above Paradise Valley

March-September 1945

Period	Snow Cover By Revised Normals %	Precip. at Paradise Valley and Orovada In.	Precip. %	Temp. at Winnemucca Departure °F	Runoff near Paradise Valley Normal	Runoff Acre-feet	Runoff %
March 1	109.9						
March		1.41	158.4	-2.2	3,610	2,880	79.8
April		0.34	42.9	-2.6	6,330	5,720	91.3
May		1.92	202.6	+1.5	6,530	10,000	153.1
June		1.62	230.5	-2.4	2,950	6,330	214.6
July		0.50	181.8	+4.6	900	1,110	123.3
August		0.06	25.5	+1.5	620	438	70.6
September		0.30	62.1	0	500	376	75.2
March-July	109.9		163.2		20,320	26,040	128.1
March-September					21,440	26,854	125.3
Previous Nov-Feb.					3,700	3,027	81.8

(3). Variation in Runoff with Type of Soil Mantle

Streams	Snow Cover (Mch. 1) % of Normal	Precip. (Mch-July) % of Normal	Runoff (Mch-July)	Excess % of Normal
(a) On steeper slopes above meadows and alluvial soil.				
Lamoille Creek (Power House)	107.1	188.8	142.8	40.7
South Fork (Lee)	114.4	"	159.2	44.8
Martin Creek (Above Paradise Valley)	109.4	163.2	128.1	18.7
(b) On medium slopes or bench land, with moderate meadows and alluvial soil.				
Marys River (Hot Springs)	89.3	188.8	188.0	98.7
North Fork (Devils Gate)	89.3	"	177.3	88.0
South Fork (Near Elko)	114.4	"	220.9	106.5
(c) In Valley bottom				
Main Upper Humboldt (Palisade)	102.8	188.8	247.0	144.2

The increase in runoff rises sharply with the alluvial type of soil mantle. Since the water-table influence must be almost entirely lacking on the steeper slopes, the excess of approximately 40 percent of normal found there may be considered the precipitation factor applicable to the nearly double precipitation that occurred. The factor of 18.7 percent on Martin Creek should have been 34 percent for its excess precipitation of 163.2 percent. But the normals for most of these stations except the South Fork near Elko and the Humboldt at Palisade and Martin Creek are based on relatively short records. If Martin Creek is selected as standard, the precipitation factor on the Upper Humboldt would be lowered from 40 to 25 percent.

On the basis of a precipitation factor of 40 percent, the residual excess due evidently to the high water table or super-saturation of the soil becomes roughly 60 percent on medium slopes and 100 percent in the broad valley. This large excess may be due in part to the excessive precipitation that satisfies somewhat the irrigation needs and reduces the water demands. From and including 1942 when double normal precipitation with the build-up of high water table occurred, the excess runoff at Palisade has been 120, 105, 46, and 145 percent. The first and the last represent also double precipitation.

4. Statistical Data

The following table (1) is an initial attempt to build up a complete picture of the water sources and runoff cycle in the Humboldt Basin. More stations and normals are desired.

Table (2) by H. C. Hoffman provides another essential summary of the snow courses in Nevada. A summary of the artesian flow at the base of Mount Charleston or Spring Range is necessary for comparison.

(1) Streamflow in the Humboldt Basin
1944-1945
(A.F.)

Streams and Gaging Stations	Winter Flow (Nov-Feb)			Summer Flow March-July			Summer Flow March-September		
	Normal	Seasonal	Percent	Normal	Seasonal	Percent	Normal	Seasonal	Percent
Marys River		2,718			58,960			59,326	
below Hot Spgs near Deeth				29,500*	55,450*	188.0*			
North Fork at Devils Gate		7,540			62,240			63,725	
				30,700*	54,440*	177.3*			
Lamoille Creek and McDermott Ditch at Power House near Lamoille		1,228		26,040	37,189	142.8		39,519	
Humboldt near Elko		23,840			290,550			295,355	
South Fork near Lee				44,000	70,040	159.2		73,070	
South Fork near Elko		10,010		81,910	180,980	220.9		186,080	
Humboldt near Carlin		34,800			463,540			474,160	
Humboldt River at Palisade	28,800	43,370	150.6	215,000 (Median 203,300)	529,400	246.2	220,700 (Median 207,200)	542,860	246.0
Martin Creek near Paradise Valley		6,353		20,320	26,040	128.1		26,834	
Little Humboldt at Chimney Dam Site		4,030			20,919			21,[illegible]	
Little Humboldt near Paradise Valley		4,974			19,087			20,005	
Cottonwood Creek		1,640			9,614			9,678	

*Apr.-July

(2) CHARLESTON DIVISION NEVADA NATIONAL FOREST SNOW COURSES

(Tabulation of March 1 snow course averages for years 1941 through 1946, six-year mean of snow depth and water content for each course, and comparison of 1946 course averages with six year mean. Snow depth and water content are expressed in inches.)

H. C. Hoffman

Name of Snow Course	Samp. Taken	Period 1941 to 1946 inclusive												% of Six-year Mean that 1946 snow course averages are			
		1941		1942		1943		1944		1945		1946					
		Snow Dep.	Water Cont.	Snow Dep.	Water Cont.	Snow Dep.	Water Cont.	Snow Dep.	Water Cont.	Snow De	Water Cont.	Snow Dep.	Water Cont.	Snow Dep.	Water Content	Snow Dep.	Water Content
Rainbow Canyon: 7800 ft. elev.	13	70.9	22.4	33.2	10.5	50.7	16.7	50.7	12.2	31.8	9.5	21.4	7.1	43.1	13.1	49.6	54.2
Kyle Canyon 8200 ft.elev.	17	60.0	18.9	28.2	8.8	47.6	15.7	53.4	12.9	33.9	9.9	19.8	6.3	40.5	12.1	48.9	52.0
Lee Can. No. 1: 8300 ft. elev.	13	56.1	16.5	26.1	7.8	43.5	13.9	37.9	9.3	51.5	13.6	13.3	4.4	38.1	10.9	34.9	40.3
Lee Can. No. 2: 9000 ft. elev.	13	68.7	20.6	32.5	9.8	54.3	17.4	39.5	8.9	48.6	13.3	21.0	6.3	44.1	12.7	47.6	49.6
Trough Springs: 8500 ft. elev.	9											9.5	2.9				
Clark Canyon 9000 ft. elev.	13											16.4	4.9				
Totals	78											101.4	31.9	165.8	48.8		
Means		63.9	19.6	30.0	9.2	49.0	15.9	45.4	10.8	41.4	11.5	16.9	5.3	41.4	12.2	40.8	43.5

SNOW SURVEYORS
MARCH 1, 1946

Truckee Basin

A. Chase
J. Church
P. Cowgill
B. Eddy
V. Hart

Tahoe Basin

F. Barkley
R. Butler
D. Gaiennie
F. Giovannoni
M. Herz
W. Herz
H. Leonard
H. Oakley
I. Simmonds
W. Simmonds
E. Wise
H. Wolfe

Carson Basin

D. Dean
F. Dean
N. Green

Upper Humboldt

B. Allred
P. Arcimis
D. Bottari
T. Brierley
H. Corta
P. Corta, Jr.
H. Dill
H. Hansen
C. Houston
R. Kuehner
W. Lear
P. Moore
E. Murphy, Jr.
J. Murphy
A. Rohwer
R. Work

Lower Humboldt

V. Arzuaga
B. Crane
C. Gnevo
E. Green
Q. Hansen
C. Houston
F. Kennedy
E. Wilkerson
L. Wilkerson
R. Work

Eastern Nevada

F. Olsen
G. Southwick
R. Thomson

Northern Great Basin

M. Jacobs

Central Great Basin

F. Daniels
H. Hoffman
Mrs. H. Hoffman
G. Maxey

NEVADA COOPERATIVE SNOW SURVEYS

State

- Nevada State Engineer
- Nevada Agricultural Experiment Station
- California Division of Water Resources
- Colorado River Commission of Nevada

Federal

- Soil Conservation Service
- Forest Service
- Weather Bureau
- Bureau of Reclamation
- Geological Survey
- Fish and Wildlife Service

Public Utilities

- Sierra Pacific Power Company
- Elko-Lamoille Power Company
- Wells Power Company

Organized Public Agencies

- Truckee-Carson Irrigation District
- Washoe County Water Conservation District
- Walker River Irrigation District
- Humboldt River Water Users